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1982 FAA R. & D. AUTHORIZATION
(Program Review)

HEARING

BEFORE THE

SUBCOMMITTEE ON TRANSPORTATION, AVIATION AND COMMUNICATIONS

OF THE

COMMITTEE ON SCIENCE AND TECHNOLOGY U.S. HOUSE OF REPRESENTATIVES

NINETY-SIXTH CONGRESS

SECOND SESSION

SEPTEMBER 18, 1980

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1982 FAA R. & D. AUTHORIZATION

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SEPTEMBER 18, 1980

HOUSE OF REPRESENTATIVES, COMMITTEE ON SCIENCE AND TECHNOLOGY, SUBCOMMITTEE ON TRANSPORTATION, AVIATION AND COMMUNICATIONS,

Washington, D.C.

The subcommittee met, pursuant to notice, at 9:35 a.m., in Room 2318, Rayburn House Office Building, Hon. Tom Harkin (chairman of the subcommittee) presiding.

Mr. HARKIN. The Subcommittee on Transportation, Aviation and Communications will come to order.

Today the Subcommittee on Transportation, Aviation and Communications will continue its review of the agencies under its jurisdiction. Last week we considered the aeronautics program of NASA. Today we will look at the R. & D. activities of the Federal Aviation Administration.

The hearing will concentrate on program accomplishments during the past year. We will also want to consider certain policy and management issues.

Next February we will conduct a second series of hearing to examine the FAA request for fiscal year 1982. Then based on the results of both sets of hearings, the subcommittee will develop legislation to authorize the FAA R. & D. program for 1982. Mr. Goldwater?

Mr. GOLDWATER. Mr. Chairman, I think these hearings are helpful to all of us to get a better feeling for what FAA is doing. I am very anxious about a number of issues, such as the ATC computer effort to improve our computer capability, the microwave landing system, collision avoidance, and all the usual things that we discuss when we get together like this.

One point I'd like to mention to Mr. Albrecht and Mr. Blake: Yesterday Tom and I sent a letter to the appropriations conference committee to encourage them to restore any cuts that were made in the 1981 FAA R. & D. budget by the Senate.

This is important, obviously, from the standpoint of having sufficient funds to get moving on the replacement of these computers. I was disappointed that the Senate saw fit to cut out about $10 million. I am not sure what effect our letter will have, but at least we are making an effort to keep that budget at a reasonable level.

Mr. HARKIN. Thank you very much Mr. Goldwater.

This morning we have two witnesses, Mr. Al Albrecht, Associate Administrator for Engineering and Development, Federal Aviation Administration, and Mr. Neal Blake, Deputy Associate Administrator for Engineering and Development, also, from the Federal Aviation Administration.

We welcome you again, gentlemen, for this overview. The House goes into session at 10. Hopefully we won't be bothered for at least 45 minutes for a rollcall or something, so we should fare well this morning, I would think.

Again, you may proceed in any manner you so desire. For the record, you might introduce your associates who are with you this morning.

STATEMENT OF AL ALBRECHT, ASSOCIATE ADMINISTRATOR FOR ENGINEERING AND DEVELOPMENT, FEDERAL AVIATION ADMINISTRATION

Mr. ALBRECHT. Thank you, Mr. Chairman.

I also have with me Mr. Martin Pozesky and Dr. Ed Koenke, who will answer questions in their areas of responsibility.

I'd also like to thank you and Mr. Goldwater for your support in the resolution of our current budget problems. This committee has been very supportive and helpful and I want you to know that we really do appreciate it.

Mr. Chairman, it is a pleasure to appear before your subcommittee and to report on the status and accomplishments of our research, engineering, and development program.

Mr. Bond has asked me to express his regrets at not being able to be here today. He is leading the U.S. delegation to the International Civil Aviation Organization Assembly in Montreal.

Before moving into a report of our progress since our last testimony, I would like to respond to a question raised by one of your staff regarding the status of the revised 5-year plan we provided you on March 12, of this year, and whether the fiscal year 1981 congressional appropriation deliberations would impact on that plan.

The very significant differences between the House and Senate on our fiscal year 1981 R.E. & D. appropriation have not been resolved. The resolution of the differences could have a significant impact upon our efforts in fiscal year 1981 and on the advanced computer program plan and schedule. The impact on the balance of our fiscal year 1981 program would be no less severe in both the near- and far-term program implications.

We would be happy to answer questions in that regard after our testimony.

I'd like to highlight the status and accomplishments of our high-priority programs beginning with aircraft separation assurance and DABS and ATARS.

This key program is on schedule. The technical data upon which a production specification will be based was handed over to the operating services in April.

We have put the DABS interference question to bed. DOD has concurred with the DABS national standard and with the proviso

that we coordinate use of the DABS data link with them. We previously had recognized that the management of the utilization of the data link was a significant element in the successful implementation of DABS, and so will not have any problem in complying with DOD's proviso. The DABS national standard was published in the Federal Register in March of this year as scheduled. Changes in the standard, necessitated by revisions to the BCAS interface with ATARS, precluded the issuance of the approved standard in April. The DABS national standard will be approved next month. This delay does not impact the overall progress of the program.

Beacon collision avoidance system, active BCAS: The active BCAS program is progressing essentially as planned. Results of tests of engineering models conducted on the west coast were very successful. The equipment performed as specified and no significant problems occurred. Our July 23 letter explained that due to technical changes to the previously coordinated ECAS national standard, we felt obligated to go public again for comments. We will issue it next month and expect to have it approved shortly after the first of the year. This slippage of 3 or 4 months may result in a comparable slippage in the availability of the first commercial units.

Full BCAS: We expect to award the contract for the design concept phase of the full BCAS in the next 30 days. We have encountered several delays in this activity and there could be an impact on the issuance of the final report. We will assess the schedule after the contract is awarded; and, if a slippage is indicated, we will take whatever steps we can to minimize that slippage.

NASA has completed its study of the reasonableness of testing the trimodal BCAS in the Los Angeles area. The study confirmed our assessment that the test would not provide any data not already available and would only result in expending critical manpower and fiscal resources. We are awaiting advice from Congressman Duncan as to any further action he may require on the matter.

Concerning aviation weather, the NEXRAD program: We are participating with the Department of Commerce and the Department of Defense in the development of a new doppler weather radar which we expect will meet our combined sensor requirements. Although some common processing of the radar signal will be done in the common equipments at the site, the processing of the sensor data for each organization's peculiar needs will be the individual agency's responsibility. The sensor development is being conducted by a special program office and will be carried out in accordance with OMB Circular A–109. The present schedule calls for the initiation of full production in mid-1986 and the sensors to be installed in a national grid by 1990.

Coincidentally, with the development of the new doppler sensor we are proceeding to address the methods and techniques of processing and displaying the data in the air traffic control centers.

We view the NEXRAD program as a high-priority effort having significant safety implications. We foresee bringing the weather data into the air traffiic control system as the sensors go on line rather than waiting for the entire grid to be installed. On that basis, we should begin to go into operation in the 1987–88 time frame which is coincidentally the planned date for the first installation of the advanced computers.

Navigation program. We are continuing to address the development, test and evaluation to determine the role of an alternative navigation system in the post 1995 time frame as a high-priority program. We expect to have our technical evaluations, our findings, and recommendations completed by the end of 1982—on schedule.

Based upon the data we have available at this time, we believe loran-C, as a technique, will probably be found to be acceptable as a supplementary en route and terminal navigation aid and may possibly be usable as a nonprecision approach aid to meet unique user requirements. There are still problems such as coverage limitations and path shifts which must be resolved before loran-C could be certificated as a primary navigation system.

We are continuing our evaluations of the possible use of NAV STAR/GPS to meet civil aviation requirements. DOD has decided to go with an 18-satellite configuration in lieu of the originally planned 24, and we are assessing the impact of this change on the coverage and availability that we require for civil applications.

We are continuing the development of a low-cost GPS receiver. The contract for the fabrication of a prototype unit was let in April of this year, and we expect to have it in test by February 1982. The unit is intended to establish general aviation user equipment requirements. Our target cost for the unit in commercial quantities is about $3,000.

Technical center building program. Our new building at the technical center was dedicated in May of this year, and we are moving into it as rapidly as possible. It is an outstanding example of a building designed to conduct research, development, and test programs. The building was constructed on time on a 24-month schedule and within its cost estimate of $50 million. It's a noteworthy accomplishment.

New initiatives program. We summarized New Engineering and Development Initiatives recommendations to 53 specific recommendations and responded to the community in a report earlier this year. A user conference to discuss the recommendations and FAA responses was held on January 29–30, 1980. The majority of the recommendations confirmed ongoing engineering and development programs and, of course, provided insights into various views on some very complex problems. Some of the recommendations and their current status in our program activities are as follows:

The New Engineering and Development Initiatives Group did not prioritize their recommendations, but we did attempt to develop a general priority list from that report and use it as a reference in the development of our own internal priorities.

FAA has a Future Surveillance System Task Force to deal with the primary and secondary radar issue, and it will respond to the New Engineering and Development Initiatives recommendations concerning primary radar.

With respect to the recommendation concerning "Electronic Flight Rules," FAA has completed a study of alternate separation concepts. Further work is required related to procedural methods and simpler ways of providing limited protection to nonparticipants in the IFR system. An alternative separation concepts workshop is planned for late this year to involve users, particularly general aviation users.

The recommendations of Topic Group 1 with respect to advanced automation, with particular emphasis to the backup and reliability

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aspects were consistent with our advanced computer-9020 replacement program planning.

The recommendations of Topic Group 1 into the air traffic control automated decision process concept feasibility and demonstration program are being considered by the FAA AERA Concept Development Team. The concept development includes consideration of airborne flight management computers, 4D area navigation, and the need for conflict free paths in an integrated flow management system.

Responding to the high level of interest by the aviation community in cockpit displays of traffic, planning for a joint FAA/NASA program on CDTI has been completed and coordinated, and work is underway. Included in the program will be the issues and potential uses for CDTI which were postulated by the New Initiatives topic groups.

FAA is strengthening its aircrew human factors efforts and is undertaking a major agencywide human factors requirements development effort. Human factors facilities are being strengthened at the Technical Center, and an active FAA/NASA program in this area is underway.

The very difficult human factors problems related to controllers in a more highly-automated environment are being addressed and studies are underway by Mitre and Rand to deal with this complex issue.

Studies are underway dealing with the voice partyline problem in a data-link environment. The studies will help determine how far one can go in computer voice as a substitute for digital data-link communications.

A series of activities are continuing to resolve the airport capacity and delay problem. Among them are the integrated flow management program, technology and site specific studies concerning potential reductions of separation with special emphasis on coping with wake vortex problems, studies to establish beneficial applications of MLS and others. An Administrator-level inter-FAA task force has been established to examine on an agency wide basis both economic and technological problems and opportunities in achieving traditional airport capacity.

Some basic work has been carried out on a program to develop performance standards for the achievement of 1,000 feet vertical separation above FL 290. Problem difinetion is progressing, and a 3- to 4-year program may be initiated.

A major activity is underway to develop an FAA-wide scenario for the turn of the century—a long-range plan for the future system and engineering and development activity required to support it.

With respect to continued user consultation, a series of public meetings and seminars on a wide variety of subjects are planned by the engineering and development organization. Among such conferences will be ones on BCAS, on DABS, and on the computer replacement program, a joint FAA/NASA workshop on CDTI and, finally, a user workshop on alternate separation concepts.

Mr. Bond recently provided the committee with detailed information on our MLS program. If you have any further questions concerning the present status of this program, I will endeavor to answer them.

Mr. Chairman, that concludes my statement. Mr. Blake will now present the status of the advanced computer program.

STATEMENT OF NEAL A. BLAKE, ASSOCIATE ADMINISTRATOR FOR ENGINEERING AND DEVELOPMENT, FEDERAL AVIATION ADMINISTRATION

Mr. BLAKE. Mr. Chairman, I appreciate the opportunity to appear before you today to further discuss the FAA's air traffic control computer replacement program. At the February 20 hearing before this subcommittee, we presented an overview of this program. That overview outlined various factors underlying the need for the computer replacement program, which concluded increased demand for air traffic control services and the need for additional new automation systems. In addition, we presented a development road map showing the relationship of advanced automation to our computer replacement program and discussed our approach to managing the program pursuant to the requirements of OMB circular A–109. We also discussed the studies performed and the public meetings we had held which assisted us in formulating requirements for the future automation system.

My presentation today will focus primarily on the progress we have made during the past several months. Before presenting a status report, though, I would like to spend a few moments briefly reviewing the scope of our computer replacement program and its relationship to our automation development programs.

We believe our air traffic control computer replacement program is the largest computer development project our country has seen to date. Initially the program will focus on replacing the en route hardware and software which is located at our 23 domestic and offshore centers. We intend to structure the system in such a way that our en route and terminal systems will be able to utilize the same hardware, software, and modular subsystems. This will provide us the option of performing en route and terminal functions in one integrated facility or in separate facilities utilizing common equipment and data sources. If this proves to be either technologically or operationally unfeasible or cost inefficient, we still have the option of using independent but compatible systems in our en route and terminal facilities.

A major goal of our computer replacement program is to obtain a system which will insure functional reliability and availability nearing 100 percent. We've established the requirement for the next generation system that it shall not fail. The systems must be capable of being integrated into the existing air traffic control system in such a way that the transition will be transparent to the controllers, to the pilots and to the users. It must, however, possess the flexibility to permit the ATC systems to change from one in which the major portion of the control functions are done by the controllers to one in which the majority of the functions are performed by the computer.

It will also be designed to accommodate changes in computer technology by allowing new advancements to be incorporated through the use of modular subsystems through the life of the system, thus prolonging the system's life so that another wholesale replacement of the entire computer system will not be necessary. The system must be able to accommodate the long-term projected growth in air traffic and also changes to the mix of aircraft using the air traffic control system. Moreover, the replacement system must be able to incorporate the new ATC philosophies, processes, and data sources that may arise in

the future from the evolution of supporting ground and airborne navigation, communication and surveillance systems.

The new en route air traffic control computer system will provide the cornerstone for substantial air traffic control evolution in the post 1990 era. The following improvements are envisioned:

The cockpit display of traffic information, which has the potential for allowing the pilot to assume additional separation responsibilities. Should this system prove desirable, implementation could begin in the early 1990's.

Increased automation of the planning and control functions which are currently performed by the air traffic control specialist. These "automated" decisionmaking functions will be closely tied to an integrated flow management system that will tie together the en route and terminal functions added in the 1980's with the national flow control capability. All of these functions will make extensive use of the discrete address beacon system data link.

Improved weather data for the automation system brought about by the introduction of the doppler weather network.

Enhanced navigation, communication, and surveillance services in the year 2000 and beyond, which may be made possible by the use of satellites.

Consolidation of terminal radar control into the en route facilities, if that should prove desirable.

Apart from the technological benefits to be attained through our computer replacement program, Id like to point out that there are also future cost reduction benefits. Once the new computers and automation enhancements are on line, the ATC system will have the capacity to handle the projected growth in air traffic and demand for services in the 1990's and we believe beyond without a proportionate increase in staffing. The use of modern solid-state equipment and the utilization of identical hardware at our en route and terminal facilities will have the added benefit of reducing the costs associated with the maintenance and technician training. Moreover, the use of more efficient aircraft climb and descent profiles and integrated flow management control will reduce fuel consumption and increase runway capacity.

Recognizing that our computer replacement program will not be completed for some time, we have identified a number of improvements we can make to the present system, as shown in this viewgraph 1, which looks more like an eye chart. Prior to the completion of our computer replacement program, we anticipate enhancing our air traffic control system with the following features: National airspace data interchange network for digital data, which is NADIN, flight service station automation, en route minimum safe altitude warning, conflict resolution, the beacon collision avoidance and automated traffic advisory and resolution systems, en route metering and spacing, moving target detection devices for our primary radars, DABS data links, en route electronic tabular display system, and the terminal information display system. These enhancements will primarily reside in processing equipment outside the present 9020 computers to prevent the system's capacity form reaching saturation prematurely. In addition, we are taking a number of steps to increase the efficiency of our current software and, hence, increase the capability of the current system.

Since the last hearing in February, our air traffic control computer replacement missions needs statement has been submitted to the Office of the Secretary of Transportation for coordination and review. Upon receiving approval, which is expected within the next month, we will proceed to the concept phase of the program. In addition, our requirements study team has completed a draft of the system requirements statement which is now in internal coordination. We anticipate the final requirements statement will be published in January.

The specification and evaluation criteria definition work began last March. We expect to have a draft specification available in December and the final specification package available next June. In addition, the complete procurement package is scheduled to go out to prospective bidders in December 1981, and we hope for a contract award in mid to late 1982.

We've also made substantial progress in establishing a program office for the computer replacement program which is shown in this viewgraph (2). An order describing the functions of this office has been prepared and is in the final stages of coordination. This order, which is expected to be approved by January, will formally establish the program office. That office will be responsible for managing the acquisition, the testing, and evaluation, as well as the installation and checkout of the air traffic control computer replacement system. The program manager will report initially to the Associate Administrator for Engineering and Development, and this will be during the first two phases of the program. At a mutually agreeable time during phase 3, a transition will be made and the program manager will then report to the Associate Administration for Air Traffic and Airway Facilities. The program manager's office, we think, will be relatively small, having a maximum of 30 people during the peak periods of the program and will manage the program, relying upon existing line organizations to perform the bulk of the work which is identified by the program manager.

We are working to develop preliminary estimates of the cost of replacing the air traffic control computer mainframes, software, and displays. These estimates will be based on our past experience and discussions with industry.

Our acquisition strategy provides for a phased reduction in the number of contractors from the concept phase to the design and critical subsystem demonstration phase and, finally, to a single-production contractor for the full development and test and evaluation phase. As we reach the end of the full development and test and evaluation phase of the program, the funding will begin to shift from the engineering and development to the facilities and equipment side of the ledger. The F. & E. authorizations will provide funding for the dual first model development, in addition to the costs associated with production, installation planning, and site preparation.

In summary, Mr. Chairman, the air traffic control computer replacement program we believe is essential to providing a system that can accommodate the projected growth in air traffic and the evolution to higher levels of automation. This evolution is necessary to provide improved system performance and capacity while at the same time controlling the growth in staffing. In addition, we will continue to take various measures to extend the useful life of the 9020 computers

in order to insure a high level of service and safety through the late 1980's.

As I explained to this subcommittee in February, we are attempting to expedite the lengthy process which is required to replace our current computer system. I believe the management approach we are taking, utilizing a program manager, will insure that the program is directed in a manner that is responsive to the needs of our operating services and the users of our system.

Mr Chairman, this completes my prepared statement.

Mr. HARKIN. Thank you very much for those statements. Without objection, they will be made part of the record in their entirety and the charts.

[Charts 1 and 2 follow:]

Federal Aviation Administration
Development Roadmap

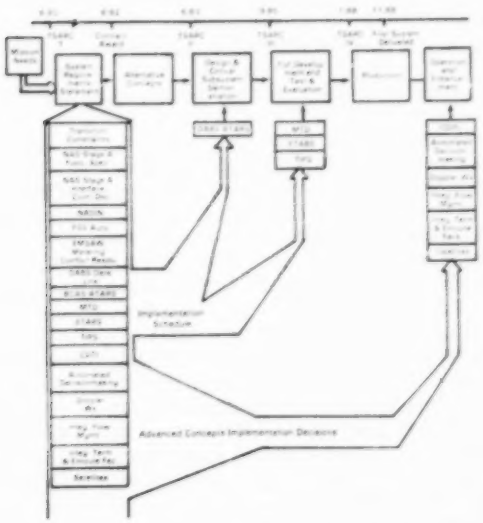

CHART 1

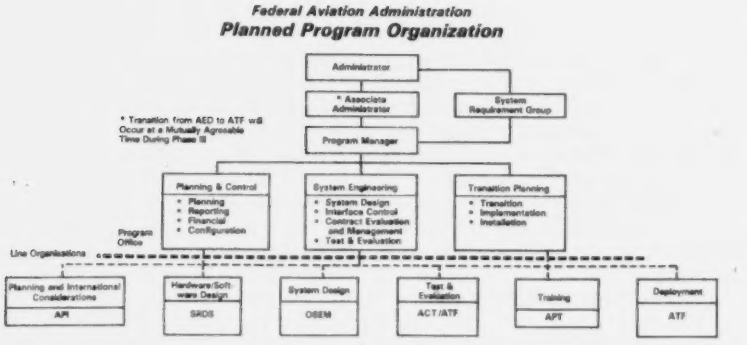

CHART 2

Mr. HARKIN. I have a question to lead off with that I have asked probably everytime you've been up here. I ask it not so much because I don't think you've ever answered it in the past but because I think it is an ongoing problem, real and perceived. I think of it as a real problem but perceive it larger than perhaps it is. I do think it is a problem.

A major criticism of the FAA that we hear, not only inhouse here but from users—the community itself—is that the R. & D. results are not quickly implemented. One key reason for this seems to be that the R. & D. projects are often undertaken by the FAA without any kind of a genuine commitment by the operating side of FAA to buy and install the developed equipment. The result is that the R. & D. winds up on the shelf. Another result is that, lacking an implementation commitment, R. & D. projects tend to be carried on for many years, much longer than they should.

Now I say that knowing full well that many times R. & D. is just that. It's R. & D. you get involved in something and you find out that it won't work, so it has to end up on the shelf. I am fully aware of that. I'm aware that not every explored avenue leads to an end and that you have to sometime explore avenues that don't lead to some kind of a fruitful end. I know that and certainly no one would say that every R. & D. project has to be taken with a commitment that it has to be fruitful in the end—that it has to lead to some x project, but we still hear this criticism a lot.

Within the context of doing necessary R. & D. unencumbered by a hard-and-fast commitment to make sure that R. & D. results in something, what steps would you suggest to assure a speedier development period, and a commitment by the operating services to implement the results of R. & D.? I am going to follow that up with another question about MLS as a case in point.

Mr. ALBRECHT. Mr. Chairman, before telling you what steps we have taken and, in effect, defending our position, I would like to say there is some cause for concern. We, too, are not pleased with the length of time it takes from the initiation of an R. & D. program until completion of implementation. We talk in terms of 15 years and that seems like an inordinately long period of time. You can break down the

anatomy of that time schedule, and it becomes reasonable if you follow the procedures we are forced to follow.

Let me talk about some positive things.

We took a look at the R. & D. products that went into the regulatory process which, let's say, is not a primary indicator, but it is a measure. We found a very small percentage were not acted upon—some were not—but it was a reasonably small percentage.

This year, Mr. Pozesky has been given the responsibility for integrating the E. & D. programs with the operating services. In that process, we have produced a document which is now on the Administrator's desk and which we will supply to the committee upon approval. It basically lists all of the E. & D. programs, it lists the date at which we provide products to the operating services, and then indicates the operating services' plans for implementation. After some negotiation, I have to say that, without exception, we have a coordinated program between ourselves and the Airway Facilities Service. I think this is a major step. It documents for all to see what we plan and what programs the operating services have specific plans to pick up.

Mr. HARKIN. I am a little unclear here now. Is this something that you have gone back a number of years and looked at projects——

Mr. ALBRECHT. No.

Mr. HARKIN. Or is this something that is right now?

Mr. ALBRECHT. Ongoing programs right now—what we intend to do in the future.

Now to some extent, the operating services are forced to look pretty much at today's problems. That is their No. 1 priority—working the system, making it operate.

Our charter is to look ahead and to make sure that new developments are available when they are needed. So in some cases we need to haul them into the future, but I have to say that the cooperation and the interface and the integration of our programs with the operating services today is very, very good.

Mr. HARKIN. Have you done any kind of analysis looking back or taking selected projects for a period of time and gone back and tried to analyze what happened between the initiation of the R. & D. and the project either moving on or not moving on and analyzing that?

You say you are doing that with the ongoing projects now; right?

Mr. ALBRECHT. Current projects.

Mr. HARKIN. Would it be a useful project to look back?

Mr. ALBRECHT. Well, it might be. We might learn some things. We thought our first priority should be given to making sure that those programs we are now working on—spending money on—are going to be picked up by the operating services and to have an interface between the R.E. & D. budget and the F. & E. budget, this has been done. So we are comfortable with what we are now doing.

I think we could go back in history. I am not sure it would be worth the effort and we have no plans to do that at this time.

Mr. HARKIN. If you feel that with this present setup that you have solved that kind of a problem or would go a long way toward it, then it would be a useful exercise.

Mr. ALBRECHT. We'd be interested in your comments on the document when we send it to the subcommittee.

Mr. HARKIN. I'd like to see it.

Mr. ALBRECHT. Fine.

Mr. HARKIN. When do you think you will have it?

Mr. ALBRECHT. It's on Mr. Bond's desk, so when he gets back from Montreal, I'd say in a few weeks, you should have it.

Mr. HARKIN. Again, this is a followup to that. It occurs to me that the MLS might be a case in point of what I have been talking about, of a lack of an implementation commitment by the operating services.

I know when I first came on this subcommittee—what; 5½ years ago—it seemed that the only thing we had to do was to get MLS through. I mean that was it. It was the big thing. It was a big push. And no delay could be afforded in getting the standard set and winning that competition up in Montreal. If I am not mistaken that is where it was, a couple, three years ago. It was just push, push, push on that. Now it seems to have fallen off.

I would cite the Commerce Business Daily announcement that FAA plans to buy now 300 to 500 ILS's. The Facilities and Equipment budget contains funds to buy only 10 MLS's in fiscal year 1981 and then no more until 1985.

As you know, we wrote a letter that four of us signed, myself, Mr. Goldwater, Mr. Wydler, and Mr. Fuqua, to Mr. Bond dated July 1, 1980, expressing our concerns about the MLS.

We received a letter back dated August 20, saying basically they are moving ahead. I don't know what the letter commits the FAA to, other than what he said in the first paragraph: "Wherefrom, we are firmly committed to export the unique and needed capability of MLS to achieving more efficient aviation system."

Well, that's fine, but I don't know what he means.

Again, I don't know that I am necessarily in favor of moving out very rapidly to deploy MLS's right away, but it seems to me we ought to have some kind of a consistent story. Either we are or we aren't

If we are not going to implement it, if we are going to move ahead with ILS for a long period of time, that raises very serious questions about all of the money and effort that we have spent on MLS sveeral years ago.

I would just like to have your thoughts on that.

Before you answer, Mr. Albrecht; Mr. Goldwater?

Mr. GOLDWATER. I would like to add to what Tom said because I signed that same letter of July 1 to Mr. Bond expressing our concern about MLS. I was less than satisfied with his answer. In fact, I concluded that his response was probably worth the paper it was printed on.

The first reason I say that has to do with the history of this project. On July 25, 1979, Mr. Bond wrote us back saying that the FAA would buy 50 MLS's per year starting in 1982. They would phase out ILS's at that time.

One year later, they were buying basically no MLS's while purchasing 300 to 500 ILS's. As best as I can conclude, the FAA appears to have changed its mind 180 degrees without really informing this committee of the change. We found out through the Commerce Business Daily that this was going on.

The second reason I am somewhat distressed by Mr. Bond's letter to us is that it appears to be more smoke than fire. It is four pages long but really doesn't say an awful lot. It was not backed up by F. & E. dollars, except for 10 MLS's in 1982. I understand that there

are zero dollars in F. & E. funds for MLS in 1983 and 1984, and the four-page letter dances around this whole issue.

The third reason I asy that perhaps the letter is not worth the paper it is printed on is that it was written as if this committee were somewhat naive.

For example, the first paragraph on page 3 essentially says: "It is not intended that our purchase of 325 new ILS's reflects any lessened FAA enthusiasm for the prospects for MLS." This to me is similar to a letter from Japan back in late December of 1941 saying "It is not intended that our attack on Pearl Harbor reflects any less enthusiasm for a better relationship between our two countries."

The last reason that I am somewhat skeptical about Mr. Bond's response to us is, as far as I can see, the same basic problem still exists which has delayed MLS implementation for so many years. Neither FAA's Operating Services nor the bulk of the users are anxious to see MLS implemented now. And perhaps they are right.

The airlines are losing money. They don't appear to be enthusiastic about having to invest in new MLS receivers. The commuter airlines are in need of safety today, not in 1988, and that means ILS and not MLS. Certainly general aviation is not excited about spending money for new types of equipment, at least right now.

I don't think any of us is advocating that FAA push blindly ahead with MLS and force unwilling users to spend a lot of money they don't have.

I think what we are simply asking is that the two parts of FAA stop fighting each other and come up with a reasonable common plan, coordinate it with the users, and tell us what it is. I don't think you have ever done this yet, and it is an embarrassment to this committee since we have authorized over $100 million over the years for MLS R. & D.

I feel that this should be something that we, or at least our staffs, Mr. Chairman, should be looking very closely at. Perhaps the staff could report back to us in February when we begin the discussions on the 1982 budget.

Mr. ALBRECHT. Well, Mr. Chairman, Mr. Goldwater, let's see if I can answer some of our concerns.

First of all, I would like to point out that you are not the only one that was somewhat surprised by the Commerce Business Daily article. It was misleading. It was not fully coordinated, and it did give the impression that we intend to buy a lot of ILS's and, therefore, the question is natural—is there room for MLS?

Let me point out that, of the 300 to 500 ILS's indicated in that article, approximately half of those can be programed to be either ILS's or MLS's.

The budget picture you cite indicates that there is no F. & E. money in 1983 and 1984. This was recently clarified with the Administrator. The F. & E. request in 1983 and 1984 will cite precision approach aids which can be either MLS or ILS. The reason for saying we need both is that there are some ILS's that are very old. They are vacuum-tube equipments, where, on a cost basis, you can justify replacing them with solid-state ILS's in the very near future, faster than you could really replace them with MLS's. So there is a replacement program for ILS's but the impression that was given, that they will all be ILS equipment is false.

We reviewed this with Mr. Bond and the Airway Facilities Service and we are completely together.

What I can't tell you is how many MLS equipments per year will be procured. This is currently under consideration, but I agree that it is a matter of importance to the committee. We will certainly make this available as soon as we know.

A part of the perceived reason for our taking longer than perhaps we should is that Mr. Bond wanted to proceed in accordance with ICAO procedures. As you know, the basic MLS decision was traumatic, and he wanted to be sure that whatever we do in this country is consistent with ICAO. We are currently proceeding to obtain approval of the standard and the recommended procedures.

The ICAO schedule calls for a worldwide meeting in 1984 basically to establish implementation.

Now that doesn't mean that we have to wait. As you know, we have plans in 1982 for an initial, we call it a preliminary production buy.

Believe me, I am not trying to skirt on this issue. It is a matter of concern and discussion. We will report back to the committee on our implementation plans when the numbers are known.

Mr. HARKIN. Just one question. We have to go vote. You talked about the old ILS's that need to be replaced—the old vacuum-tube systems. I don't know how many you are talking about. You say maybe half of the 300—the old ones; like that?

Mr. ALBRECHT. About 250.

Mr. HARKIN. Well, it just occurs to me why replace them with new solid-state ILS's? Why don't you just put in the MLS and have two systems side by side. You know, you have it all capitalized. The thing has been paid for. You don't have to worry about that. So it is old. So it is not as efficient.

Mr. ALBRECHT. I think the airway facilities people would answer: Part of the reason is that we can do it much faster than installing MLS's. First of all, we need to develop certification criteria for MLS's. We need to develop basically FAA procedures that are necessary when we install a piece of new equipment.

With ILS, we can move right now. That is the logic in this area.

Mr. HARKIN. You have an old system working.

Mr. ALBRECHT. Yes.

Mr. HARKIN. It works.

Mr. ALBRECHT. Sure it works. It works fine.

Mr. HARKIN. It's been working for years.

Mr. ALBRECHT. That's right.

Mr. HARKIN. Why replace it with a brandnew solid-state ILS system that's going to cost money and, then 5 years down the road, 8 years down the road maybe, come along and replace that with an MLS? Why don't you just put the MLS in? You talk about a transition period anyway. You are going to have to have it. You might think about that.

We will just recess for about 10 minutes and come back.

[Recess taken.]

Mr. HARKIN. The subcommittee will come to order.

As I remember, the last question asked was why can't we have the MLS's side by side with the old ILS's rather than putting the new solid-state ILS's in and then replacing them later on.

Mr. ALBRECHT. Well, the answer from an overall FAA point of view, particularly Airway Facilities, Mr. Chairman, is first of all to recognize that the transition from ILS to MLS is going to take some time, probably a considerable amount of time.

Part of the problem is that one has to make avionics available. People have to buy avionics so they can instrument their airplanes.

Mr. HARKIN. Al, excuse me. Just a minute. Will you back up. So there is going to be a transition period.

It seems to me you would start with the oldest system that you have that you want to replace and start putting in the MLS's there as a transition, especially if those old ones will continue to work for several more years to give you that transition period of time.

Mr. ALBRECHT. Without debating that question, we have some folks taking a real hard look at what makes sense in terms of introducing MLS—where should you do it?

The commuter community had a conference here a few months ago, and they basically came out and said—we need, we want MLS for the following 10 reasons because of what it can do—multiple glide, curved approaches, no spectrum saturation—you know all of these good things, but we have to have something.

They were really telling us, either give off the dime or we may have to buy ILS's if it is going to take too long, and we really didn't want to hear that, but that is the real world.

We are taking a hard look at where it is that it makes sense to put the MLS equipment. For example, one might talk about a State like Michigan that is having problems because carriers are pulling out and there is no railway network. Commuters are coming in. They need precision aids. It is kind of a closed system in that one could put a network together where you could provide avionics for those people using those facilities in a reasonable time frame, and that may be a way to start.

The Airway Facilities folks look at cost benefit. It turns out replacing the old tube type will be paid for in 10 years of operations with solid-state ILS's. Basically, they are saying we can't wait for an implementation program that sweeps in these systems. Figure out the best way to implement MLS, but we need to replace those old tube types because it is just costing too much money to continue to operate them.

Mr. GOLDWATER. I think one of the things that is disturbing is not seeing an implementation plan.

Mr. ALBRECHT. Well, an implementation plan is due early next year, a transition plan that talks about how we go about this, should go out for public comment next month. It is a long-awaited document to be sure, but we are essentially there.

Mr. GOLDWATER. Isn't the transition plan part of the implementation plan?

Mr. ALBRECHT. It is a precursor. It is a preliminary document that talks about the problems of transition, how one goes from one system to the other. An implementation plan is a lot more specific in terms of numbers and quantities and when and, perhaps, where. We are getting there.

Mr. ROYER. I have just a couple of quick questions, Mr. Chairman.

At another hearing there was an indication that you are moving forward on the DARC system, and I am just wondering where it is in comparison to the ATC computer replacement?

Mr. ALBRECHT. I will have to answer for the Airway Facilities people, Mr. Royer, who are not here today, but the DARC system is being installed. It is a backup. It does not provide all of the information the present system provides, we recognize this. This was pointed out in the recent Senate committee report.

We do have plans to modify the DARC program to add some other capabilities, it is a very successful installation. If you go to Leesburg and see the equipment, it occupies very little floor space; and, as far as we are concerned, it operates very well and is doing the job it was intended to do.

Mr. ROYER. So installation is fairly close to completion at Leesburg?

Mr. ALBRECHT. The installation at Leesburg is now complete.

Mr. ROYER. What about the software that we have had some problems with? Is it your feeling that the new technology or the new hardware is not going to develop the same kind of problems that we have had?

Mr. ALBRECHT. Well, we have to talk about several things. Certainly the computer replacement program will have some of the difficulties that exist with any very large operational system. It is not unique.

The current enroute automation system, if I remember the numbers—there is a lot of publicity about outages, we are talking about something like one per week per center. The number really is not that large.

In terms of our being able to manage the current software program, we go through a very extensive procedure. Any software change has to, in the first instance, be debugged at our technical center where we have a "typical" system.

Then it goes to one center, an operation center, where it also has to be tested and debugged. Then it goes to the other centers. Occasionally, there are problems since each center is a little different—there are site specific problems—but we go through a very elaborate procedure before we install software in the field.

Mr. ROYER. What will the upgraded systems do for ATC capacity? I know Mr. Bond has indicated several times that we may get to a point where we have to limit access to the ATC system due to demand exceeding capacity. Will these programs do anything to increase capacity? Do we have any other studies going on to give us a better handle on the needed capacity, other than expanding airports and so on?

Mr. ALBRECHT. Well there are two kinds of problems you have to look at. One is capacity of the en route air traffic control system and the terminal system to handle the number of aircraft that it has to. That's the one that the computer replacement program is addressing and, basically, it automates the procedure. It enables us to handle more and more traffic without substantially increaxing the number of controllers.

There is a different kind of capacity limitation, and that is the airport itself. How many aircraft can you put on the concrete that is available? We have a group taking a very hard look at that problem. There are technological improvements that you can make to help the capacity situation, but you probably can't go as far as you would like to.

So I think the spirit of Mr. Bond's comment was, when we have done everything we can, we still may have a capacity problem that will require nontechnical solutions.

Mr. ROYER. Mr. Blake mentioned adjustments that are going to have to be made at the Center for phasing in the new computers. What kind of program have you established to make sure that this works smoothly? I can see some problems there based on what I've heard from some of the operators?

Mr. ALBRECHT. Yes. Well, we agree this is a problem area. In fact, if I had to list the more significant problems in the replacement program, they are the people-related problems. I do not question we can do technically what we have to do, but transitioning a brandnew system into the operating environment has to be done painlessly. It has to be done in a transparent manner so that controllers and pilots do not have to make major changes in their operations.

Now we have in our program office a functional group devoted entirely to that problem, manned by people from the operating services. So we are taking a look at how one goes about doing that early in the game.

Mr. ROYER. Thank you, Mr. Chairman. That is a point which we ought to emphasize. I think it is going to take great care in order that adjustments can be made with everybody's concurrence.

Mr. ALBRECHT. We agree with that.

Mr. ROYER. Thank you, Mr. Chairman.

Mr. HARKIN. I am not certain I completely understand this whole thing on the MLS. Perhaps, our questions may be more appropriately directed to the operating services and, perhaps, we will have them up here to talk to them.

One last thing that I had is regarding helicopter noise. What are the proposed rules on helicopter noise? I am just wondering if from your end of the business you could talk about the problem. Is it really much of a problem? Are there operational techniques or new technologies available that protect that portion of the public that would be affected and? at the same time, not cause economic hardships on helicopter operators? Are you devoting any resources to this problem at all?

Mr. ALBRECHT. Mr. Chairman, that particular problem is one that is handled by the environmental group not our organization, but perhaps Mr. Blake can tell you what is going on there.

Mr. BLAKE. Yes, we are of course very much concerned with the proper manner in which to handle the current helicopters. This past summer we took noise measurements of a number of existing helicopters to establish exactly what levels and type of noise we are currently exposed to.

Once this information is available, it will be used to established procedures to minimize the noise exposure in the large suburban and metropolitan areas and the procedures will probably make extensive use of MLS curved approaches and perhaps aeronavigation.

Now looking toward the future, that is helicopters that will be produced later in time, NASA is conducting a fairly extensive program to look at what can be done in rotor design and airframe design to reduce noise generation at the source.

With respect to resources, there are no resources in the particular appropriation we are talking about, but there are some within the environmental area, about $300,000 a year for FAA. I am not sure

what the level of funding is at NASA, but we can provide that information. (NASA has directed approximately $1 million toward helicopter noise reduction research in fiscal year 1981.)

Mr. GOLDWATER. Mr. Chairman, last February, the question was raised of how much money FAA would need over a 5-year period to do this research and development and do a good job.

Finally, Mr. Bond responded by letter and said it would be about $950 million for 5-year period, instead of the $500 million requested by the administration in their propose ADAP bill.

Mr. ALBRECHT. It was $953 million, that was the correct figure.

Mr. GOLDWATER. I have two questions about that. Are the figures that you gave us in March still valid figures or are they appraised upward; second, are you going to be allowed to ask for the higher figures, or will the Department of Transportation and OMB cut you back?

Mr. ALBRECHT. The first question: Are the numbers still valid? I believe they are valid. We have not changed our estimates. We think the numbers we gave you are still correct.

As you know, there is some controversy over the fiscal year 1981 budget. We hope that reason prevails and that some of the money that has been indicated may be cut will be restored.

I can't talk about fiscal year 1982 because that is currently under discussion, but we will be happy to bring the committee up to date as soon as the President's fiscal year 1982 budget is announced.

Mr. GOLDWATER. You have been spending a lot of time, I assume, trying to provide information for those that are trying to restore the $10 million cut in the Senate appropriations bill. One of the questions I would be interested in is what would be the effect of a $10 million cut?

Mr. ALBRECHT. Well, Mr. Goldwater, there are several answers to that. The first one is, if you take a look at the basis for the cut, it basically says we believe you have difficulties with the current 9020 program that need to be straightened out' and, until you get them straightened out and can report what you are doing, don't spend any money in fiscal year 1981 on a replacement program.

Now the logic behind that escapes me, but if you take that as being the basis for the cut, then one has to examine what programs are in the fiscal year 1981 budget request that could not be done. You end up with some studies that are supportive of the questions being asked by the Senate committee, but a majority of the work on a computer replacement program stops.

Now this is not a decision I would be happy with, and we would do our damndest to reevaluate to see if we could——

Mr. GOLDWATER. What kind of work are you talking about that would stop?

Mr. ALBRECHT. We're talking about contract studies; technology studies; and, work to get ready for the initiation of concept development contracts in fiscal year 1983. We are talking about all the up-front systems engineering work that is required in order to properly plan this kind of a program. It is important work that needs to be done.

Unlike other programs, if you are late somebody gets fired or someone gets unhappy, we can't be late on this program. We need to meet the operational dates.

Mr. GOLDWATER. So the concern is on the 9020, that you are not doing the right things?

Mr. ALBRECHT. That's the allegation.

Mr. GOLDWATER. So the new computer procurement program is jeopardized or would be set back, I assume, if the $10 million were not appropriated?

Mr. ALBRECHT. That is correct.

Mr. GOLDWATER. And the $10 million is basically to be used to get ready for that procurement?

Mr. ALBRECHT. We are following OMB Circular A-109. We are going to have competitive contracts for the concept development. Before one does that, one needs to develop specification requirements. One needs to do a lot of background studies that indicate to what extent. for example, one can fully automate the process to begin with.

We have taken a look at the various features of the replacement system and when they can come along in time. It takes a lot of background information to write the kind of procurement documents that will result in the kind of products we need. It is a big systems engineering job, and we are doing the upfront work now. Any stoppage in that just delays the effort and increases the cost of the final product.

Mr. GOLDWATER. In your efforts to respond to the Senate's concern in this $10 million cut, how much of your time has been spent in briefing the Department of Transportation?

Mr. ALBRECHT. Not a great deal in briefing the Department of Transportation, but we have, during the past week or so spent a considerable amount of time looking at the recommendations of the Senate committee, evaluating basically the charges made by the study group, and evaluating our ability to respond to those charges. It has been a very time-consuming effort for the past few weeks.

Mr. GOLDWATER. Has the Department of Transportation represented the FAA in those discussions or has there been an effort to represent themselves?

Mr. ALBRECHT. They've become involved in these discussions, very much so in terms of interface with the Members of Congress and interface with the committees.

Mr. GOLDWATER. Is the FAA doing interfacing or is the Department of Transportation?

Mr. ALBRECHT. I think we are both doing it, Mr. Goldwater. We are doing it whether we see there is a need, both the FAA and the Department.

Mr. GOLDWATER. Are you making any progress in finding frequencies to implement the self-service control towers at uncontrolled AG airports?

Mr. ALBRECHT. Mr. Pozesky will answer that question.

Mr. POZESKY. I think the expert is Dr. Koenke.

Dr. KOENKE. I think the answer, is, Yes, we are making some progress.

A group has been established with representatives of the operating services and engineering and development. They are looking at the 25-kilohertz spacing problem. Thirteen frequencies are currently identified for application in that area.

The problem is equippage, but nonetheless those frequencies have been identified.

Mr. GOLDWATER. Thirteen frequencies have been identified as potential candidates?

Dr. KOENKE. Yes.

Mr. GOLDWATER. What is the next step?

Dr. KOENKE. The next step is to get implementation of the 720-channel radios in order that the service can be taken advantage of.

Mr. GOLDWATER. What do you mean: "implementation of the 720-channel radios?"

Dr. KOENKE. Well, if a discrete 25-kilohertz frequency, say, one of the 13 is established for an airport, in order to use that, the people have to have the capability of dialing up that frequency, obviously. If it is not one of the 50- or 100-kilohertz frequencies, they can't use the service.

Mr. GOLDWATER. What are you going to do, put a gun to the people's head and tell them to buy the 720?

Dr. KOENKE. No. There is a recommendation from the "group" stating that we would like to institute 25-kilohertz spacing by 1985, which says that, in order to get air traffic control service, you would need to have a 25-kilohertz radio. The recommendation also calls for the issuance of an NPRM in December to facilitate implementation.

Mr. GOLDWATER. So what are you going to do—make it mandatory that everybody buy a 720-channel radio?

Dr. KOENKE. You make it mandatory only from the standpoint that, if you want ATC service, you need to have a 25-kilohertz, 720-channel, radio.

Mr. GOLDWATER. OK. So you already have ATC service today without it?

Dr. KOENKE. Right.

Mr. GOLDWATER. What you are talking about is providing more service by splitting the channels?

Dr. KOENKE. Yes.

Mr. GOLDWATER. If you want the enhanced service, then you have to buy the 720 channel. So that is true today in some places I suspect.

Dr. KOENKE. Well, the 25-kilohertz spacing, to my knowledge, is used in positive control airspace above 18,000 today.

Mr. GOLDWATER. I think I've used it in controlled airspace below 18,000.

Dr. KOENKE. TCA, possibly.

Mr. GOLDWATER. That's down the coast of California, but nevertheless, it sounds to me like you are looking for a reason not to do this.

Dr. KOENKE. I'm certainly not looking for a reason not to do this. We've put together a group to try to identify frequencies that would be available. We have identified 13. We are planning to put together an NPRM. There is also another plan which says, have the FCC limit sale of radios to 720-channel equipment, much like in the CB area where they eliminated the sale of 23-channel radios, you then had to go to the 40-channel sets. That is another proposition.

The group has not gotten confirmation or has not coordinated on a variety of different approaches that they are looking at. It is in progress now.

Mr. GOLDWATER. Is there a schedule on this? Can you give us some kind of dates when we can anticipate certain things happening?

Dr. KOENKE. The recommendation will be to publish the NPRM by December. At that point, we will get back quite a bit of information, responses from the users, I'm quite sure.

Mr. GOLDWATER. Today you have tower frequencies ranging from about 118.0 to about 122.0. Those tower frequencies were spaced out so that they don't overlap. Those are available today and most people can receive them on their existing radios.

Dr. KOENKE. Yes.

Mr. GOLDWATER. Have they looked into the feasibility of actually assigning one of those frequencies that are not being used in the immediate area as the self-service control frequency?

Dr. KOENKE. One of the 100-kilohertz spacing channels?

Mr. GOLDWATER. Yes.

Dr. KOENKE. We have looked at what it would take to provide this service, say, in the Washington area, the number of frequencies necessary, to eliminate overlap at the public-use airports in the Washington area, is phenomenal. It is up around 30 to 40 frequencies that would be required. We are not talking about one frequency here.

Mr. GOLDWATER. Yes.

Dr. KOENKE. OK. So then we have to ask the question—how many frequencies would I need to allow some overlap and what is is going to be acceptable? And that problem is being looked at.

Mr. GOLDWATER. Mr. Chairman, I have one other question I want to explore regarding collision avoidance systems. One of our concerns is the delay of 2 years in the DABS/ATARS. It looks like 1986 before the first production DABS/ATARS will be in place, and 1989 before all 90 are installed. That is a long time to wait for protection in dense terminal areas. I am wondering if you are sure the delay is worth it?

Mr. ALBRECHT. Mr. Goldwater, our plan, again subject to the current budget discussions, is to buy five equipments as fast as we can and to install these and use them to develop the kind of certification information that our flight operations people need for the production equipment. In parallel with that, we intend to be responsive to A–109 and go out and try to procure competitively the systems that would indeed be delivered several years later, but on a time frame consistent with the availability of certification information.

That is a long answer to the question, but we believe that, if we pursue that plan, we will provide equipment in the field as soon as can be done.

Mr. GOLDWATER. In regard to the flight test of BCAS on the surface, it was very successful. But, when you lift up the pages and look inside the report, what are the bad things you saw?

Mr. ALBRECHT. Marty.

Mr. GOLDWATER. Or the negative things; problems?

Mr. POZESKY. Mr. Goldwater, the full data has not been produced yet, so I don't think I can provide a very complete answer, but I can't think of any bad things. They have not been reported to me. Nothing but success and very strong optimism in terms of the system's performance, as compared to the prediction and anticipation, has been reported to me.

I have met several times with the people who have flown it. I have flown the system myself. The system is working very well, Mr. Goldwater, much better than many of the engineers dared to hope. I have nothing negative at this point to report.

Mr. ALBRECHT. Dr. Koenke has flown the system. Mr. Bond has flown the system. What they tell me is that the number of missed

alerts, the number of false alerts, is extremely small and that things are working very, very well.

Mr. GOLDWATER. Would it be possible when you get your evaluation to get a copy to us or at least some kind of report indicating the good and bad?

Mr. ALBRECHT. We would be delighted.

Mr. POZESKY. I think it is important that we do note that the system has flown in about 14—I hate to quote numbers, but the numbers are clearly in the teens—operational environments—New York, Los Angeles, Seattle, Midwest operational environments, Washington—basically in approach configurations and in high-density airports, and it is working quite well.

The big problem that many of us anticipated, as you know, Mr. Goldwater, you went through hearings with us, a major false-alarm problem. We have tailored the system to five different sensitivity levels now, and they seem to be working quite well. The false-alarm problem, if you use the sensitivity levels as they were designed, is quite controllable and, in fact, is very, very small.

I heard a number, about one false alarm per week in an average air carrier operation due to logic problems in the design of the box. That number will have to be verified, and it is very unofficial. It is not documented, but those are the kinds of numbers that the engineers and the test people are talking about at this point.

Mr. GOLDWATER. That is good to hear. I guess I remain a pessimist. When FAA tells me everything is fine, I guess I am not a total believer. I am anticipating there has to be something wrong, but I am looking forward to being proven incorrect.

Mr. POZESKY. We will have, I hope, a preliminary test report out in about a month, which will be completing the first round of testing. We will be testing the system through the end of the year.

You may know, Mr. Goldwater, we have a company called Delmo-Victor under contract to produce three of these units. They will begin flight testing on airline aircraft, I hope, next summer. They will be delivered in March 1981, and they should be installed for online field testing—operational testing—by early summer 1981.

Mr. GOLDWATER. Are these big breadboard models or something?

Mr. POZESKY. No, sir. These are packaged air-carrier-quality units.

Mr. GOLDWATER. Who is the contractor on that?

Mr. POZESKY. Delmo-Victor.

Mr. GOLDWATER. Out of where?

Mr. POZESKY. California.

Mr. GOLDWATER. Where in California?

Mr. POZESKY. San Diego and Palos Verdes area.

Mr. GOLDWATER. Mr. Chairman, I want to ask something about wake vortex alleviation. Last week we had NASA up here. They talked about what they were doing in this area. The bottom line is that they really hadn't found an operationally acceptable approach to wake vortex alleviation, at least one that the industry would accept.

The good news is they still seem to be committed to trying to further explore what can be done.

In that regard, the FAA has a ground-based vortex advisory system—VAS—that really has never been operational, as far as I know. It has very little prospects in the near future to beocme operational. I'm just wondering what your comments are about your efforts in this area?

Mr. BLAKE. Well, the NASA activity is, of course, of a research nature. We did have some encouraging results with the Boeing 747. We did have interest from the Lockheed Corp. in seeing whether similar results could be achieved with the L–1011.

I think we are still hopeful that they can be achieved. There have been some problems in modifying the control system which operates the spoilers on that aircraft, and we have not been able to duplicate the results of the 747 as yet.

Now in addition to those flight-test types of activities, NASA has gone back and is spending a fair amount of research money to try to understand the basic phenomena which resulted in dissipation of the vortices in the case of the Boeing and to see what other things might be tried on aircraft airflowsjwhich would be applicable across the wide-body fleet.

Both NASA and the FAA are continuing to push very hard in that area because of the extremely high payoff that could result if we were successful. We have to recognize that it is a very difficult and not a thoroughly understood area, but I think the resources that are being applied should producejsomegood results.

Mr. GOLDWATER. But that is strictly operational; right?

Mr. BLAKE. It is not really an operational question at this point in time. We are trying to find a technique for modifying the control system, or, perhaps, add some additional things to the wing tip which would successfully alleviate the vortex and do it in a way that could be considered acceptable by the operators of the aircraft; that is, the additional costs in terms of noise and fuel should be near negligible.

Mr. GOLDWATER. And you are working with NASA on this?

Mr. BLAKE. Yes.

Mr. GOLDWATER. What about your ground-based VAS system? What is going on there?

Mr. BLAKE. The VAS system has been tested and the flight telt of the system showed that, when the ground system said it was safe t close up the separation, it was in fact safe to do so.

Mr. GOLDWATER. It wasjnot?

Mr. BLAKE. It was in all cases safe to do so.

I think there has been some concern on the part jof the airline pilots about using the system in VFR, as well as IFR conditions and also some concern that the air traffic separation might close up to less than 3 miles. These are primarily operational problems, and we are considering what steps we should take next to make the system acceptable to the user but, so far as technical success, that has been shown, as expected.

Mr. ALBRECHT. We have a problem to work out with the pilots but, basically a ground-based measurement is a predictive technique, and it is a matter of judgment whether the prediction is one that they want to count on. It is an ongoing problem.

Mr. GOLDWATER. Your ground-base system is predictive? It is not precise?

Mr. ALBRECHT. No; we don't make an absolute measurement jin space. Based on measurementsjon the ground, we predict what will happen in space. So it is a matter of judgment in terms of how good that prediction is. Our tests show that it is very good, but the pilot has the right to reserve judgment.

Mr. GOLDWATER. That is always true. You are providing service or information. What is the concern of the pilots; that the information is not accurate?

Mr. ALBRECHT. That it might not be in some cases; yes.

Mr. GOLDWATER. So what is your program then? Are you just going to drop it or are you pursuing it?

Mr. ALBRECHT. No; we are doing several things. We certainly are going to pursue that issue in terms of measurements to further verify that the technique we are using is the correct one. In addition, we are taking a hard look to see what can be done to develop ground sensors that can measure exactly what is going on in space. That is a tough problem, but we are taking a real good look at it.

Mr. GOLDWATER. That technical approach is what—basically, doppler or laser?

Mr. ALBRECHT. Well, almost any technique that you pick you can find something wrong with it, but you have to make sure that you get adequate range and sufficient resolution. We really haven't settled on a way to do it as yet.

Mr. GOLDWATER. There is at least the appearance by the FAA of trying to push general aviation out of controlled airspace, or at least limiting general aviation access to airspace—especially in the future.

One of your programs which could help GA in this particular area is called electronic flight rule so general aviation would in essence fly independent of the ATC system.

Where do you stand on this?

Dr. KOENKE. We began work on EFR as a result of the new E. & D. initiatives conference, we are developing a concept that would allow the general aviation user to get services from the ATC system without filing an IFR flight plan, separation services in IMC conditions.

We went to Lincoln Laboratory to develop this particular concept, and we have a report on this now. Unfortunately, in terms of implementation, it requires ground surveillance throughout the airspace where this service is to be provided, therefore you can't provide it everywhere.

The other thing that it does is to compromise the current procedural IFR service.

So what we are doing now is planning to have a workshop early next year with the user community specifically geared toward trying to get other approaches to this problem.

Mr. HARKIN. Gentlemen, I do not have anymore questions. If you have anything more to add that you would like to bring up, you are more than welcome to.

Mr. ALBRECHT. We have no additional subjects, Mr. Chairman.

Mr. HARKIN. Thank you very much.

The subcommittee will then stand adjourned until Tuesday, September 30, when we will have another hearing with the Department of Energy transportation programs at 9:30 in room 2325.

Mr. ALBRECHT. Thank you, Mr. Chairman.

Mr. HARKIN. Thank you very much, gentlemen.

[Whereupon, at 11:30 a.m., the subcommittee hearing was adjourned].

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